Case Study
Evolving Research into Effects of Recreational Activity on Wildlife

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- Nesting bald eagles habitat on Forest Service, need to balance habitat and recreational needs.
- The Rocky Mountain Research Station has been studying the effects of human activity on nesting bald eagles since the late 1970's.
  - Between 1983-1985, during >51,000 hours of observations, 71 volunteers from the Forest Service nest watch program recorded nearly 4,200 human activities in the vicinity of 13 active nest sites.
  - To analyze these data, a hierarchical list of 12 disturbance parameters was developed, quantifying the physical and temporal characteristics of the human activity or action, and the status and response of affected wildlife, or reaction.
  - Physical characteristics include the type, severity, and proximity of the activity. Temporal characteristics include frequency, duration, and timing of that activity.
  - At the same time, one has to consider the target species status, i.e., its activity, its location or position relative to the disturbance, and the degree of buffering from that disturbance. These are the independent variables.
  - Wildlife response comprises the dependent variables used to assess overall effect.
- Classification tree modeling [CART] facilitated development of dichotomous, decision trees for predicting frequency of eagle response from partitioned characteristics of the human activity.
  - In order of importance, our models used distance to the disturbance, duration, visibility, number, position, and sound level to build trees for pooled disturbance as well as for pedestrian, vehicle, aquatic, aircraft, and noise groupings.
  - The pooled disturbance tree showed 85% eagle response at <72 meters, 64% at <215 meters, 45% between 215-583 meters, and 24% at >583 meters, with number and visibility affecting response between 73-215 meters, and duration and sound affecting response at greater distances.
- Since the original Arizona research, we have used this approach to model bald eagle response rates and develop management guidelines for 3 types of aircraft [light planes, jets, and helicopters], for nesting eagles in Michigan, and for recreational watercraft in northern Minnesota.
  - While valuable and applicable to this day, one significant shortcoming in all this work was that data collection was passive, leaving us no control over experimental design.
- In the mid 90's our focus shifted specifically to noise effects of military helicopters on nesting Mexican spotted owls on the Lincoln National Forest, New Mexico. And, for the first time, we were allowed to actually control and design the presentation of overflights, as well as running

chainsaws for comparison, at active owl nest sites in the field.

- Chainsaws although not nearly so 'loud' [59 dB] elicited much greater response from owls than low flying helicopters [102 dB].
- Type, distance, position, duration, frequency, and timing were all factors.
- Most important, however, was the spotted owl's hearing sensitivity. Much of a helicopter's sound energy is low frequency outside an owl's hearing range, whereas more of a chainsaw's higher frequency energy falls within that range.
- Results provided management guidelines tailored to permit both activities, but specifically varied to accommodate the way the resource heard them.

- Building on this pioneering noise study, we looked at noise characteristics and effects of enduro motorcycles on northern spotted owls on the Mendocino National Forest, California. In controlled experimentation we presented nesting owls with 1 hour of motorcycle drive-by's at varying distances, and found no flushes when motorcycles >70 m or <76 dB.
- Presently we are focusing on habituation testing of ATVs by spotted owls on the Coconino National Forest in northern Arizona.
- Throughout all this work, it has become apparent that wildlife typically are much more tolerant and adaptable than expected. While evaluating human activity effects on wildlife is a complex and multivariate problem, hope springs from the fact that potential effects can often be mitigated by considering the subtleties of both the human activity and the wildlife response.
- Remember that we live in their ecosystem, and they live in ours and we need to live together!

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